

REMARKS/ARGUMENTS

Claims 21-23 are active and drawn to the elected subject matter.

The Examiner has maintained that the claims would have been obvious in view of Finley, Honjo and Greenberg. The rejection of Claim 23 further in view of Krisko has also been maintained.

Applicants previously explained that that Finley requires the presence of cubic or orthorhombic zirconium oxide phases to facilitate the anatase form of the titanium dioxide layer deposited on that zirconium oxide layer (see paragraph [0010] of Finley). Therefore, modifying Finley to replace the direct contact between the zirconium oxide and titanium oxide so that the titanium oxide directly contacts the silicon dioxide (as required in the present claims) would NOT have been done. Indeed, performing such a replacement is completely contrary to Finley's requirement and would render Finley's invention inoperable for its intended use.

The Examiner responds to this argument starting at page 5 of the Official Action. Briefly, the Examiner finds that Greenberg provides sufficient motivation to make the replacements alleged in the rejection because Greenberg discussion including zirconium dioxide or silicon dioxide to form partially crystallized titanium dioxide, i.e., zirconium dioxide and silicon dioxide are equivalent in this regard.

Applicants respectfully disagree with the Examiner's findings and conclusion underlying the rejection as the skilled person would not have replaced the ZrO_2 layer of Finley with a SiO_2 layer, as Finley requires a specific ZrO_2 layer (orthorhombic or cubic). Further, it is known to the skilled person that SiO_2 is usually amorphous and is therefore very different in terms of structure from cubic or orthorhombic ZrO_2 .

So as to further demonstrate the erroneous nature of the Examiner's contention that zirconium dioxide and silicon dioxide are equivalent, particularly for the purpose that Finley requires Applicants provide a series of published information, known to the skilled person.

More specifically, Applicants disagree with the Examiner's contention because:

- SiO₂ thin films are always amorphous (glass-like), whatever the technique used.
- Greenberg gives a long list of amorphous or crystalline oxides but does not state that silicon oxides can be crystalline.

Greenberg teaches that ZrO₂ and SiO₂ can be used as "SIBD", i.e. barrier layers against alkali migration. But this effect has nothing in common with the effect of cubic or orthorhombic ZrO₂ used by Finley, which is to promote the crystallization of anatase form of TiO₂. Therefore, even if SiO₂ and ZrO₂ can be considered as equivalents for the sodium barrier purpose, they cannot be considered as equivalents for the purpose of assisting the anatase growth. For this last purpose, the crystalline structure is of prime importance, and as SiO₂ is amorphous, it cannot be considered as equivalent to crystalline ZrO₂ by the skilled person.

To this end, see the attached pages from Pulker, Coatings on Glass where in table 1, page 98, SiO₂ made by dip-coating is described as amorphous, on pages 319 and 320, dedicated to SiO₂, it states that "evaporated films are always vitreous amorphous". SiO₂ films are described later as "glass like," in table 15, page 371, SiO₂ obtained by sputtering are described as "glasslike," and in table 20, page 376, SiO₂ obtained by high vacuum evaporation are described as amorphous.

From an article published by Cerac, Inc, discussing SiO₂ thin films states that "in contrast to the parent quartz, silica films are amorphous and never obtain the equivalent

density, hardness or water permeability of the crystal form" (see second paragraph) and "Film layers are amorphous and smooth" (third paragraph).

From pages 159 and 166 of the book "Thin Films on Glass", Hans Bach, Dieter Krause, Springer-verlag Berlin, 1997, SiO₂ layers are usually amorphous and therefore lack the long-range order present in crystalline materials (see page 159) and on page 166, the last paragraph describing that all SiO₂ films shown in Fig. 4.26 (obtained through 4 different techniques) are amorphous.

Finley **requires** the presence of cubic or orthorhombic zirconium oxide phases to facilitate the anatase form of the titanium dioxide layer deposited on that zirconium oxide layer (see paragraph [0010] of Finley). Therefore, modifying Finley to replace the direct contact between the zirconium oxide and titanium oxide so that the titanium oxide directly contacts the silicon dioxide (as required in the present claims) would NOT have been done. Indeed, performing such a replacement is completely contrary to Finley's requirement and would render Finley's invention inoperable for its intended use. See MPEP 2143.01 sec. V and VI.

The only way to achieve the claimed invention is to ignore the required zirconium-titanium oxide layers contact that Finley describes so as to insert a silicon dioxide layer in between those layers, which is not proper in light of Finley's teachings. Further, the skilled person would not have replaced the ZrO₂ layer of Finley with a SiO₂ layer, as Finley requires a specific ZrO₂ layer (orthorhombic or cubic) and as demonstrated by the attached evidence, SiO₂ is considered amorphous and would not serve a suitable substitute for Finley's specific ZrO₂ layer (orthorhombic or cubic).

Applicants also continue to disagree that Honjo would have motivated one to modify Finley's temperature treatment to be the same as that claimed as has been discussed at length previously particularly in light of Finley's teachings the combined teachings of these

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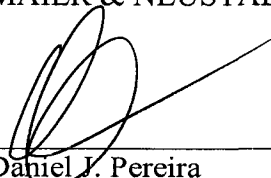
references lead one away, rather than towards, the claimed invention which utilizes temperatures above 630°C as the skilled person would expect a lower anatase formation based on what Finley teaches.

Withdrawal of the rejections is requested.

A Notice of Allowance is requested.

Respectfully submitted,

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